Electrochemical Characterization of Respiratory Complex I Reconstituted on a Supported Biomimetic Membrane over a Gold Electrode

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NADH: quinone oxidoreductase, which is also known as respiratory complex I, is a membrane-bound enzyme that has an essential function in cellular energy production. It couples NADH:quinone oxidoreduction to translocation of protons across the cellular (in prokaryotes) or mitochondrial membranes. Therefore, complex I contributes to the establishment and maintenance of the proton motive force required for ATP synthesis, transport and motility. In addition, by reducing the quinone pool inside the membrane, the enzyme allows electron transport to the next enzymatic complex of the respiratory chain.[1,2]

We have developed a strategy for reconstituting the structure and functionality of the bacterial complex I from *Rhodothermus marinus*[3] onto a biomimetic membrane supported on gold electrodes modified with a thiol self-assembled monolayer (SAM). We show that this modified electrode allows us to study both the electron transfer and the proton translocation by the enzyme, simulating the *in vivo* conditions, using electrochemical methods.

[1] Efremov, R. G.; Baradaran, R.; Sazanov, L. A. *Nature* **2010**, *465*, 441-446.
[2] Brandt, U. *Biochim. Biophys. Acta* **2011**, *1807*, 1364-1369.
[3] Batista, A.P.; Fernandes, A. Louro, R.O; Steuber, J.; Pereira, M. M. *Biochim.Biophys. Acta* **2010**, *1797*, 509–515.